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SEQUENCE LISTING

5 <110> Biotica Technology Limited
Pfizer Inc
Gaißer, Sabine

10 <120> Polyketides and their synthesis

10 <130> IP0013-W001

15 <150> GB0327721.7
<151> 2003-11-28

15 <160> 57

15 <170> PatentIn version 3.2

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55 Ile Leu Gly Asp Asn Val Phe His Gly Pro Gly Phe Ser Ser Val Leu
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Val Lys Asp Ala His Arg Tyr Gly Val Gly Glu Ile Asp Ser Gly Gly

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25 Arg Gly Phe Ala Trp Leu Asp Met Gly Thr His Asp Ser Leu Leu Gln
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5 His Leu Asp Leu Phe Arg Ser Leu Leu Gly Glu Gly Asp Arg Leu Gly
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10 Leu Ser Ile Ser Tyr Ala Glu Gln Arg Glu Pro Arg Gly Ile Ala Glu
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15 Ala Phe Leu Ile Gly Ala Arg His Ile Gly Gly Asp Asp Ala Ala Leu
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20 Ile Leu Gly Asp Asn Val Phe His Gly Pro Gly Phe Ser Ser Val Leu
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25 Thr Gly Thr Val Ala Arg Leu Asp Gly Cys Glu Leu Phe Gly Tyr Pro
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30 Val Lys Asp Ala His Arg Tyr Gly Val Gly Glu Ile Asp Ser Gly Gly
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35 Arg Leu Leu Ser Leu Glu Glu Lys Pro Arg Arg Pro Leu Glu Pro Gly
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40 Arg His Arg Leu Tyr Leu Tyr Thr Asn Asp Val Val Glu Ile Ala Arg
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45 Thr Ile Ser Pro Ser Ala Arg Gly Glu Leu Glu Ile Thr Asp Val Asn
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50 Lys Val Tyr Leu Glu Gln Gly Arg Ala Ala His Gly Ala Gly Ala Val
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55 Val Ala Trp Leu Asp Met Gly Thr His Asp Ser Leu Leu Gln Ala Gly
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60 Gln Tyr Val Gln Leu Leu Glu Gln Arg Gln Gly Glu Arg Ile Ala Cys
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65 Ile Glu Glu Ile Ala Met Arg Met Gly Phe Ile Ser Ala Glu Gln Cys
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70 Tyr Arg Leu Gly Gln Glu Leu Arg Ser Ser Ser Tyr Gly Ser Tyr Ile
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30 Ala Asp Gln Ala Leu Val Arg Arg Leu Met Glu Gly Val Gly Leu Val
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35 Val His Phe Ala Ala Glu Ser His Val Asp Arg Ser Ile Glu Ser Ser
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40 Glu Ala Phe Val Arg Thr Asn Val Glu Gly Thr Arg Val Leu Leu Gln
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45 Ala Ala Val Asp Ala Gly Val Gly Arg Phe Val His Ile Ser Thr Asp
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50 Glu Val Tyr Gly Ser Ile Ala Glu Gly Ser Trp Pro Glu Asp His Pro
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60 Leu Ala Leu Ala Tyr His Arg Thr Tyr Gly Leu Asp Val Arg Val Thr
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65 Arg Cys Ser Asn Asn Tyr Gly Pro Arg Gln Tyr Pro Glu Lys Ala Val
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70 Pro Leu Phe Thr Thr Asn Leu Leu Asp Gly Leu Pro Val Pro Leu Tyr
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Arg Gly Val Ala Leu Val Ala Ala Gly Gly Arg Pro Gly Val Ile Tyr
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Ile Leu Glu Leu Cys Gly Ala Asp Arg Ser Ala Val Arg Arg Val Ala
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Asp Arg Pro Gly His Asp Arg Arg Tyr Ser Val Asp Thr Thr Lys Ile
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Arg Glu Glu Leu Gly Tyr Ala Pro Arg Thr Gly Ile Thr Glu Gly Leu
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Thr Val Val Leu Asp Lys Leu Thr Tyr Ala Gly Asn Pro Ala Asn Leu
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Glu His Val Ala Gly His Pro Asp Leu Glu Phe Val Arg Gly Asp Ile
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Ala Asp His Gly Trp Trp Arg Arg Leu Met Glu Gly Val Gly Leu Val
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5 Glu Ala Phe Val Arg Thr Asn Val Glu Gly Thr Arg Val Leu Leu Gln
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10 Ala Ala Val Asp Ala Gly Val Gly Arg Phe Val His Ile Ser Thr Asp
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15 Glu Val Tyr Gly Ser Ile Ala Glu Gly Ser Trp Pro Glu Asp His Pro
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20 Val Ala Pro Asn Ser Pro Tyr Ala Ala Thr Lys Ala Ala Ser Asp Leu
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30 Arg Cys Ser Asn Asn Tyr Gly Pro Arg Gln Tyr Pro Glu Lys Ala Val
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35 Pro Leu Phe Thr Thr Asn Leu Leu Asp Gly Leu Pro Val Pro Leu Tyr
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40 Gly Asp Gly Gly Asn Thr Arg Glu Trp Leu His Val Asp Asp His Cys
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45 Arg Gly Val Ala Leu Val Gly Ala Gly Arg Pro Gly Val Ile Tyr
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50 Asn Ile Gly Gly Thr Glu Leu Thr Asn Ala Glu Leu Thr Asp Arg
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55 Ile Leu Glu Leu Cys Gly Ala Asp Arg Ser Ala Leu Arg Arg Val Ala
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60 Asp Arg Pro Gly His Asp Arg Arg Tyr Ser Val Asp Thr Thr Lys Ile
275 280 285

65 Arg Glu Glu Leu Gly Tyr Ala Pro Arg Thr Gly Ile Thr Glu Gly Leu
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70 Ala Gly Thr Val Ala Trp Tyr Arg Asp Asn Arg Ala Trp Trp Glu Pro
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	tcctggaaac	acgcctcgg	acagcagacg	atcatgtcg	ccatgtgctt	ctgcgcgtcg	1680
	aacggcgaca	gcaccatcga	cgacatggtg	gctggggccc	gttcctggaa	accggacactc	1740
	gtcctgtggg	agccattcac	ctacgcggga	ccgtcgccg	cgcacgcctg	cggcgccgccc	1800

12/35

5	cacgccccgc tgctgtgggg tcccgacgtg gtcctcaacg cacggcggca gttcacccgg	1860
	ctgctcgccg agcgccccgt cgaacagcgc gaggacccgg tcggcgaatg gctcacgtgg	1920
10	acgctggagc gccacggcct cgccgcccac gcggacacga tcgaggaact gttcgccggg	1980
	cagtggacga tcgacccag cgccgggagc ctgcggctgc cggtcgacgg cgaggtcgtg	2040
	cccatgcgct tcgtgccgta caacggcgcc tcggtcggtcc cccgctggct ctccgagccg	2100
	cctgccccgc cccgggtctg cgtcaccctc ggcgtctcca cccgggagac ctacggcacg	2160
	gacggcgtcc cgttccacga actgctggcc ggactggccg acgtggacgc cgagatcgtc	2220
15	gccaccctcg acgcggggca gctcccgac gccgcccgtc tgcccgaa tgtgcgcgtc	2280.
	gtcgacttcg tgccgctgga cgccctgctg ccgagctgcg ccgcgatcgt ccaccacgga	2340
20	ggcgcggaa cctgttac ggccaccgtg cacggcgtcc cgcagatcgt cgtggctcc	2400
	ctctggacg cgccgctgaa ggccacccaa ctcggcagg cggcgccgg gatgcacctg	2460
	gaccccgaaa aactggcgt ggacaccctg cgcggcggc tcgtgcgggt gctggagac	2520
25	cgcgagatgg ccgtggcggc gcgtcgccctc gccgacgaga tgctcgccgc ccccaccccg	2580
	gccgcgctcg tcccccgctc cgaacgcctc accgcccgc accgcccgc ctgatcccgc	2640
30	caaggagccc ccatgaacct cgaatacagc ggccacatcg cccggttgta cgacctggtc	2700
	caccaggaa agggcaagga ctaccggcg gaggccgagg agctggccgc gcttgtcacc	2760
	cagccccccgc cccggggccgc ctccctccctc gacgtggcct gcggAACGGG gatgcacctg	2820
35	cggcacctcg gcgaccttt cgaggagggtg gccgggtgg agatgtcccc cgacatgctg	2880
	gccatcgccgc agcggcgc aa cccggaggcc ggcacccacc ggggggacat gcggacttc	2940
40	gccctcggcc gccgcttcga cgccgtgatc tgcatgttca gttccatcg gcacatcg	3000
	gaccagcggg aactggacgc ggccatcgcc cggacccgttcc gtcggcggg	3060
	gtcgtgatcg tcgatccctg gtgggtcccg gagacgttca caccgggttgc cgtggcgc	3120
45	agcctcgatcg aggccgaggcc cccgacccatc gcgcgttct cccactccgc gtcgaggac	3180
	ggccgcaccc ggatcgatgt ggactacctc gtcggcgtgc cgggggaggg ggtgcggcac	3240
50	ttgaaggaga cccatcgat caccgtttcc gggcgtgc agtacgaggc ggcccttccacc	3300
	gcggcggggaa tgtccgtcga gtacctcccg cacggccca cccgacccggg actttcgac	3360
	ggcgtccagg cctga	3375
55	<210> 8	
	<211> 295	
	<212> PRT	
	<213> Streptomyces eurythermus	
60	<400> 8	

13/35

Met Lys Gly Ile Ile Leu Ala Gly Gly Ser Gly Thr Arg Leu Arg Pro
1 5 10 15

5 Leu Thr Gly Ala Leu Ser Lys Gln Leu Leu Pro Val Tyr Asp Lys Pro
20 25 30

10 Met Ile Tyr Tyr Pro Leu Ser Val Leu Met Leu Ala Gly Ile Arg Asp
35 40 45

15 Ile Gln Ile Ile Thr Ser Lys Thr His Leu Glu Met Phe Arg Ser Leu
50 55 60

20 Leu Gly Asp Gly Ser Arg Ile Gly Ile Ser Val Gly Tyr Ala Glu Gln
65 70 75 80

25 Glu Glu Pro Arg Gly Ile Ala Glu Ala Phe Leu Ile Gly Glu Glu His
85 90 95

30 Ile Gly Asp Asp Pro Val Ala Leu Ile Leu Gly Asp Asn Val Phe His
100 105 110

35 Gly Pro Gly Phe Ser Ser Val Leu Ala Ser Thr Ala Ala Arg Leu Asp
115 120 125

40 Gly Cys Glu Leu Phe Gly Tyr Pro Val Lys Asp Pro Arg Arg Tyr Gly
130 135 140

45 Val Gly Glu Val Asp Ala Glu Gly Arg Leu Val Ser Leu Glu Glu Lys
145 150 155 160

50 Pro Glu Lys Pro Arg Ser His Leu Ala Val Thr Gly Leu Tyr Phe Tyr
165 170 175

55 Asp Asn Gly Val Val Asp Ile Ala Arg Arg Leu Thr Pro Ser Pro Arg
180 185 190

50 Gly Glu Leu Glu Ile Thr Asp Val Asn Lys Val Tyr Leu Glu Gln Gly
195 200 205

55 Arg Ala Arg Met Thr Glu Leu Gly Arg Gly Phe Ala Trp Leu Asp Met
210 215 220

50 Gly Thr His Ser Ser Leu Leu Gln Ala Gly Gln Tyr Val Gln Leu Leu
225 230 235 240

14/35

Glu Gln Arg Gln Gly Val Arg Ile Ser Cys Val Glu Glu Ile Ala Leu
245 250 255

5 Arg Met Gly Tyr Ile Ser Ala Arg Gln Cys His Glu Leu Gly Arg Glu
260 265 270

10 Leu Glu Ser Ser Ser Tyr Gly Arg Tyr Leu Met Asp Val Ala Glu Thr
275 280 285

15 Leu Met Ser Gly Pro Ala Ala
290 295

20 <210> 9
<211> 332
<212> PRT
<213> *Streptomyces eurythermus*

25 <400> 9

Met Arg Leu Leu Val Thr Gly Gly Ala Gly Phe Ile Gly Ser His Phe
1 5 10 15

30 Val Arg Gln Leu Leu Ala Gly Ala Tyr Pro Asp Leu Ala Gly Ala Arg
20 25 30

35 Thr Val Val Val Asp Lys Leu Thr Tyr Ala Gly Asn Leu Ala Asn Leu
35 40 45

40 Asp Pro Val Ala Asp His Pro Ser Leu Glu Phe Val His Ala Asp Ile
50 55 60

45 Arg Asp Ala Glu Val Met Ser Arg Val Val Arg Gly Ala Asp Val Val
65 70 75 80

50 Val His Phe Ala Ala Glu Ser His Val Asp Arg Ser Ile Ala Asp Ala
85 90 95

55 Ser Ala Phe Val Glu Thr Asn Val Arg Gly Thr Gln Val Leu Leu Gln
100 105 110

60 Ala Ala Val Glu Ala Gly Ala Gly Arg Phe Val His Val Ser Thr Asp
115 120 125

65 Glu Val Tyr Gly Ser Ile Ala Glu Gly Ser Trp Arg Glu Glu Gln Pro
130 135 140

70 Leu Ala Pro Asn Ser Pro Tyr Ala Ala Ser Lys Ala Ala Ser Asp Leu
145 150 155 160

Leu Ala Leu Ala Tyr His Arg Thr Tyr Gly Leu Pro Val Val Val Thr
165 170 175

5

Arg Cys Ser Asn Asn Tyr Gly Pro Tyr Gln His Pro Glu Lys Val Val
180 185 190

10

Pro Leu Phe Ala Thr Asn Leu Leu Asp Gly Leu Thr Val Pro Leu Tyr
195 200 205

15 Ser Asp Gly Gly Asn Ser Arg Asp Trp Leu His Val Asp Asp His Cys
210 215 220

20 Arg Gly Ile Ser Leu Val Ala Thr Arg Gly Arg Pro Gly Glu Val Tyr
225 230 235 240

25 His Ile Gly Gly Gly Thr Glu Leu Thr Asn Arg Glu Leu Thr Lys Arg
245 250 255

Leu Leu Gly Leu Cys Gly Ala Asp Ala Ser Ser Val Arg His Val Ala
260 265 270

30 Asp Arg Pro Gly His Asp Leu Arg Tyr Ala Leu Asp Ile Gly Lys Ile
275 280 285

35 Thr Gly Glu Leu Gly Tyr Ala Pro Arg Thr Asp Phe Thr Thr Gly Leu
290 295 300

40 Ala Asp Thr Val Arg Trp Tyr Ala Glu Asn Arg Ala Trp Trp Glu Pro
305 310 315 320

45 Leu Lys Lys Ala Ala Gln Glu Ala Arg Arg Thr Asp
325 330

50 <210> 10
<211> 787
<212> PRT
<213> Streptomyces eurythermus

<400> 10

55 Val Ser Thr Pro Ser Ala Pro Pro Val Pro Gly Ala Pro Ser Pro Ala
1 5 10 15

60 Gly His Pro Asp Glu Gly Leu Trp Val Arg Arg Tyr Arg Pro Val Arg
20 25 30

16/35

Asp Pro Glu Leu Arg Leu Val Cys Phe Pro His Ala Gly Gly Ala Ala
35 40 45

5 Thr Ser Phe Ala Ala Leu Ala Arg Gly Leu Asp Glu Thr Val Glu Ala
50 55 60

10 Leu Ala Val Gln Tyr Pro Gly Arg Gln Asp Arg Arg His Glu Pro Phe
65 70 75 80

15 Ile Pro Ser Ile Ser Gly Leu Val Asp Gln Val Val Pro Glu Ile Leu
85 90 95

20 Arg Trp Ala Asp Arg Pro Leu Ala Leu Phe Gly His Ser Met Gly Ala
100 105 110

25 Thr Val Ala Phe Glu Val Ala Arg Arg Leu Arg Gly Ser Gly Gln Ala
115 120 125

30 Ser Pro Val His Leu Leu Val Ser Gly Arg Arg Ala Pro Thr Val Arg
130 135 140

35 Arg Arg Asp Val Ala His Leu Leu Asp Asp Asp Ala Leu Ile Ala Glu
145 150 155 160

40 Ile Ala Thr Leu Gln Gly Thr Glu Asp Ala Val Leu Gln Asp Glu Glu
165 170 175

45 Leu Leu Arg Leu Ala Leu Pro Ala Ile Arg Asn Asp Tyr Arg Ala Ala
180 185 190

50 Gly Thr Tyr Ala Tyr Val Pro Gly Gly Ala Leu Asp Cys Pro Val Thr
195 200 205

55 Val Leu Thr Gly Asp Arg Asp Pro Asp Val Pro Leu Glu Glu Ala Arg
210 215 220

60 Ala Trp Arg Glu Leu Thr Thr Gly Pro Phe Ala Leu His Thr Phe Ala
225 230 235 240

65 Gly Gly His Phe Tyr Leu Asn Asp Arg Met Asp Glu Val Cys Arg Thr
245 250 255

70 Ile Gly Asp Ala Leu Ala Gly Thr Ala Thr Ala Asp Thr Ala Thr Gly
260 265 270

75 Thr Val Pro Pro Arg Thr Ala Ala Asp Thr Ser Thr Gly Pro Val Pro

17/35

275

280

285

5 Pro Arg Thr Ala Ala Asp Thr Ala Arg Glu Pro Val Pro Pro Arg Ser
290 295 300

10 Ala Pro Ala Pro His Gly Ala Ala Arg Arg Arg Ala Asp Ala Val Arg
305 310 315 320

15 Pro Gly Asp Pro Val Asp Thr Ala Arg Arg Val Leu Val Ser Ala Arg
325 330 335

20 Thr Ala Asp Ser Ala Val Thr Pro Phe Asp Gly Ile Ser Gly Trp Leu
340 345 350

25 Ala Glu Arg Leu Arg Ala Gly Arg Phe Asp Val Ser Arg Val Pro Phe
355 360 365

30 Ala Glu Leu Arg Gly Trp Ser Phe His Pro Gly Thr Gly Asn Leu His
370 375 380

35 His Ala Ser Gly Arg Phe Phe Ser Val Glu Gly Leu His Val Arg Thr
385 390 395 400

40 Asp Arg Leu Pro Glu Arg Gly Trp Thr Gln Pro Ile Ile Val Gln Pro
405 410 415

45 Glu Val Gly Leu Leu Gly Ile Val Ala Arg Glu Ile Asp Gly Val Leu
420 425 430

50 His Phe Leu Met Gln Ala Lys Met Glu Pro Gly Asn Val Asn Val Leu
435 440 445

55 Gln Val Ser Pro Thr Val Gln Ala Thr Arg Ser Asn Phe Thr Gly Val
450 455 460

60 His Arg Gly Arg Asp Ile Arg Tyr Leu Asp Leu Phe Met Gly Pro Arg
465 470 475 480

65 Arg Ala Arg Val Leu Val Asp Ser Ile Gln Ser Glu Gln Ala Asp Trp
485 490 495

70 Phe Leu Ala Lys Arg Asn Arg Asn Met Ile Val Glu Leu Ala Ala Asp
500 505 510

75 Asp Asp Leu Asp Ile Gly Glu Asp Phe Arg Trp Leu Thr Leu Gly Gln
515 520 525

Leu Arg Arg Leu Leu Met Leu Asp Asn Val Val Asn Met Asp Ala Arg
530 535 540

5

Ser Ile Leu Ala Cys Leu Pro Thr Ala Asp Ala Asp Ala Ser Ala Pro
545 550 555 560

10

Ser Pro Val Leu Arg Ser Phe Phe Gly Ser Pro Gly Ala Ala Arg His
565 570 575

15

Thr Thr Ala Glu Val Leu Thr Trp Phe Thr Gly Val Arg Ala Leu Arg
580 585 590

20

Glu Leu Val Gln Asn Arg Val Pro Leu Asp Thr Val Thr Ala Asp Gly
595 600 605

25

Trp Tyr Arg Thr Pro His Glu Ile Ala His Glu Ser Gly Arg His Phe
610 615 620

Arg Val Met Ala Ala Glu Val Ser Ala Ser Ser Arg Glu Val Thr Ser
625 630 635 640

30

Trp Thr Gln Pro Leu Ile Glu Pro Arg Leu Pro Gly Leu Met Ala Leu
645 650 655

35

Leu Val Lys Ser Val Asp Gly Val Leu His Ala Leu Val Arg Ala Arg
660 665 670

40

Val Asp Val Gly His Leu Asn Val Ala Glu Leu Ala Pro Thr Val Gln
675 680 685

Cys Arg Pro Gln Glu His Thr Gly Pro Arg Gly Leu Pro Gly Pro Pro
690 695 700

45

Tyr Leu Glu Asp Val Leu Ser Ala Pro Pro Gln Asp Val Arg Tyr Asp
705 710 715 720

50

Ala Val Gln Ser Glu Glu Gly Arg Phe Phe His Ala Gln Asn Arg
725 730 735

55

Tyr Val Ile Val Glu Val Pro His Asp Phe Pro Glu Asp Ala Pro Asp
740 745 750

60

Asp Phe Ala Trp Leu Ser Leu Gly Gln Leu Thr Gly Leu Leu Ala His
755 760 765

Gly Asn Tyr Leu Asn Ile Glu Leu Arg Thr Leu Val Ala Cys Ala His
770 775 780

5
Thr Leu Tyr
785

10 <210> 11
<211> 333
<212> PRT
<213> Streptomyces eurythermus

15 <400> 11

Met Val Asn Asp Pro Met Pro Arg Gly Ser Gly Ser Gly Ser Val Val
1 5 10 15

20 Val Leu Gly Gly Ala Gly Tyr Val Gly Arg His Val Cys Ala Ala Phe
20 25 30

25 Ala Ala Arg Gly Arg Asp Val Val Val Val Gly Arg Arg Pro Pro Glu
35 40 45

30 Glu Pro Met Pro Tyr Arg Cys Val Thr Leu Asp Leu Ala Gly Thr Asp
50 55 60

35 Pro Ala Ala Leu Ala Ala Leu Asp Ala Glu Arg Pro Asp Thr Ile
65 70 75 80

40 Val Asn Ser Val Gly Ser Ile Trp Gly Arg Thr Asp Glu Gln Met Trp
85 90 95

45 Ser Ala Thr Ala Val Pro Thr Leu Arg Leu Leu Glu Ala Leu Ala Leu
100 105 110

50 Met Ser Ala Arg Pro Arg Leu Val His Leu Gly Ser Val Leu Glu Tyr
115 120 125

55 Gly Pro Val Thr Pro Gly Gly Ser Val Gly Ala Asp Ala Val Pro Arg
130 135 140

Pro Asp Thr Ala Tyr Gly Arg Ser Lys Leu Ala Ala Ser Glu Ala Val
145 150 155 160

60 Leu Arg Gly Thr Ser Gly Gly Trp Val Asp Gly Val Val Leu Arg Val
165 170 175

Ser Asn Val Ser Gly Pro Gly Thr Pro Arg Ile Ser Leu Leu Gly Gln

20/35

180

185

190

5 Val Ala Glu Arg Leu Leu Ala Ala Ala Gly Thr Gly Ala Glu Ala Val
195 200 205

10 Val Glu Leu Ser Arg Leu Arg Ala His Arg Asp Tyr Val Asp Val Arg
210 215 220

Asp Val Ala Asp Ala Val Val Ala Ala Ala Arg Ala Pro Ala Val Pro
225 230 235 240

15 Val Ala Val Gly Ile Gly Arg Gly Glu Ala Val Ala Val Arg Asp Leu
245 250 255

20 Val Gly Leu Phe Ile Glu Ala Ser Gly Ile Pro Ala Arg Val Val Glu
260 265 270

25 Arg Pro Ala Pro Gly Arg Ala Pro Gly His Arg Glu Asp Trp Leu Arg
275 280 285

30 Val Asp Thr Gly Ala Ala Arg Ala Leu Leu Gly Trp Ala Pro Arg Arg
290 295 300

Ser Leu Arg Glu Ser Val Arg Asp Cys Trp His Asp Leu Val Arg Ala
305 310 315 320

35 His Arg Leu Pro Thr Thr Pro Ser Lys His Ser Gly Gly
325 330

40 <210> 12
<211> 373
<212> PRT
<213> Streptomyces eurythermus

45 <400> 12

Val Thr Thr Tyr Val Trp Asp Tyr Leu Ala Glu Tyr Gln Asn Glu Arg
1 5 10 15

50 Ala Asp Leu Leu Asp Ala Val Glu Thr Val Phe Ala Ser Gly Gln Leu
20 25 30

55 Val Leu Gly Pro Ser Val Asp Gly Phe Glu Lys Glu Phe Ala Asp Tyr
35 40 45

60 His Gly Leu Arg His Cys Gly Gly Val Asp Asn Gly Thr Asn Ala Val
50 55 60

21/35

5 Lys Leu Gly Leu Gln Ala Leu Gly Val Gly Pro Gly Asp Glu Val Val
65 70 75 80

10 Thr Val Ser Asn Thr Ala Ala Pro Thr Val Val Ala Ile Asp Gly Thr
85 90 95

15 Gly Ala Thr Pro Val Phe Val Asp Val Arg Ala Glu Asp His Leu Met
100 105 110

20 Asp Thr Asp Gln Val Ala Asp Val Ile Thr Pro Arg Thr Lys Ala Leu
115 120 125

25 Leu Pro Val His Leu Tyr Gly Gln Cys Val Asp Met Ala Pro Leu Arg
130 135 140

30 Ala Leu Ala Glu Gln His Gly Leu Val Val Leu Glu Asp Cys Ala Gln
145 150 155 160

35 Ala His Gly Ala Arg His His Gly Glu Leu Ala Gly Thr Leu Gly Asp
165 170 175

40 Ala Ala Ala Phe Ser Phe Tyr Pro Thr Lys Val Leu Gly Ala Tyr Gly
180 185 190

45 Asp Gly Gly Ala Val Leu Thr Asp Asp Ala Asp Val Asp Arg Ala Leu
195 200 205

50 Arg Arg Leu Arg Tyr Tyr Gly Met Glu Asp Val Tyr Tyr Val Val Gln
210 215 220

55 Thr Pro Gly His Asn Ser Arg Leu Asp Glu Val Gln Ala Glu Ile Leu
225 230 235 240

60 Arg Arg Lys Leu Thr Arg Leu Asp Arg Tyr Ile Glu Gly Arg Arg Ala
245 250 255

65 Val Ala Arg Arg Tyr Ala Glu Gly Leu Ala Asn Leu Thr Gly Pro Gly
260 265 270

70 Gly Leu Val Leu Pro Ser Val Thr Glu Gly Asn Asp His Val Tyr Tyr
275 280 285

75 Val Tyr Val Val Arg His Pro Arg Arg Asp Asp Ile Ile Glu Ala Leu
290 295 300

22/35

Lys Ser Tyr Gly Ile Ser Leu Asn Ile Ser Tyr Pro Trp Pro Val His
305 310 315 320

5 Thr Met Thr Gly Phe Ala His Leu Gly Tyr Ala Lys Gly Ser Leu Pro
325 330 335

10 Val Thr Glu Arg Leu Ala Asp Glu Ile Phe Ser Leu Pro Met Tyr Pro
340 345 350

15 Gly Leu Ala Pro Asp Val Gln Asp Lys Val Ile Ala Ala Leu His Glu
355 360 365

20 Val Leu Ala Thr Leu
370

25 <210> 13
<211> 447
<212> PRT
<213> Streptomyces eurythermus

30 <400> 13

35 Val Ser Pro Ala Pro Ala Thr Glu Asp Pro Ala Ala Ala Gly Arg Arg
1 5 10 15

40 Leu Gln Leu Thr Arg Ala Ala Gln Trp Phe Ala Gly Thr Gln Asp Asp
20 25 30

45 Pro Tyr Ala Leu Val Leu Arg Ala Glu Ala Thr Asp Pro Ala Pro Tyr
35 40 45

50 Glu Glu Arg Ile Arg Ala His Gly Pro Leu Phe Arg Ser Asp Leu Leu
50 55 60

55 Asp Thr Trp Val Thr Ala Ser Arg Ala Val Ala Asp Glu Val Ile Thr
65 70 75 80

60 Ser Pro Ala Phe Asp Gly Leu Thr Ala Asp Gly Arg Arg Pro Gly Ala
85 90 95

65 Arg Glu Leu Pro Leu Ser Gly Thr Ala Leu Asp Ala Asp Arg Ala Thr
100 105 110

70 Cys Ala Arg Phe Gly Ala Leu Thr Ala Trp Gly Gly Pro Leu Leu Pro
115 120 125

75 Ala Pro His Glu Arg Ala Leu Arg Glu Ser Ala Glu Arg Arg Ala His
130 135 140

5 Thr Leu Leu Asp Gly Ala Glu Ala Ala Leu Ala Ala Asp Gly Thr Val
145 150 155 160

10 Asp Leu Val Asp Ala Tyr Ala Arg Arg Leu Pro Ala Leu Val Leu Arg
165 170 175

15 Glu Gln Leu Gly Val Pro Glu Glu Ala Ala Thr Ala Phe Glu Asp Ala
180 185 190

20 Leu Ala Gly Cys Arg Arg Thr Leu Asp Gly Ala Leu Cys Pro Gln Leu
195 200 205

25 Leu Pro Asp Ala Val Ala Gly Val Arg Ala Glu Ala Ala Leu Thr Ala
210 215 220

30 Val Leu Ala Ser Ala Leu Arg Gly Thr Pro Ala Gly Arg Ala Pro Asp
225 230 235 240

35 Ala Val Ala Ala Ala Arg Thr Leu Ala Val Ala Ala Ala Glu Pro Ala
245 250 255

40 Ala Thr Leu Val Gly Asn Ala Val Gln Glu Leu Leu Ala Arg Pro Ala
260 265 270

45 Gln Trp Ala Glu Leu Val Arg Asp Pro Arg Leu Ala Ala Ala Val
275 280 285

50 Thr Glu Thr Leu Arg Val Ala Pro Pro Val Arg Leu Glu Arg Arg Val
290 295 300

55 Ala Arg Glu Asp Thr Asp Ile Ala Gly Gln Arg Leu Pro Ala Gly Gly
305 310 315 320

60 Ser Val Val Ile Leu Val Ala Ala Val Asn Arg Ala Pro Val Ser Ala
325 330 335

65 Gly Ser Asp Ala Ser Thr Thr Val Pro His Ala Gly Gly Arg Pro Arg
340 345 350

70 Thr Ser Ala Pro Ser Val Pro Ser Ala Pro Phe Asp Leu Thr Arg Pro
355 360 365

75 Val Ala Ala Pro Gly Pro Phe Gly Leu Pro Gly Asp Leu His Phe Arg
370 375 380

24/35

Leu Gly Gly Pro Leu Val Gly Thr Val Ala Glu Ala Ala Leu Gly Ala
385 390 395 400

5

Leu Ala Ala Arg Leu Pro Gly Leu Arg Ala Ala Gly Pro Ala Val Arg
405 410 415

10 Arg Arg Arg Ser Pro Val Leu His Gly His Ala Arg Leu Pro Val Ala
420 425 430

15 Val Ala Arg Thr Ala Arg Asp Leu Pro Ala Thr Ala Pro Arg Asn
435 440 445

<210> 14

<211> 424

20 <212> PRT

<213> Streptomyces eurythermus

<400> 14

25 Met Arg Ile Leu Leu Thr Ser Phe Ala His Asn Thr His Tyr Tyr Asn
1 5 10 15

30 Leu Val Pro Leu Gly Trp Ala Leu Arg Ala Ala Gly His Asp Val Arg
20 25 30

35 Val Ala Ser Gln Pro Ser Leu Thr Gly Thr Ile Thr Gly Ser Gly Leu
35 40 45

35 Thr Ala Val Pro Val Gly Asp Asp Thr Ala Ile Val Glu Leu Ile Thr
50 55 60

40 Glu Ile Gly Asp Asp Leu Val Leu Tyr Gln Gln Gly Met Asp Phe Val
65 70 75 80

45 Asp Thr Arg Asp Glu Pro Leu Ser Trp Glu His Ala Leu Gly Gln Gln
85 90 95

50 Thr Ile Met Ser Ala Met Cys Phe Ser Pro Leu Asn Gly Asp Ser Thr
100 105 110

55 Ile Asp Asp Met Val Ala Leu Ala Arg Ser Trp Lys Pro Asp Leu Val
115 120 125

60 Leu Trp Glu Pro Phe Thr Tyr Ala Gly Pro Val Ala Ala His Ala Cys
130 135 140

Gly Ala Ala His Ala Arg Leu Leu Trp Gly Pro Asp Val Val Leu Asn

25/35

145 150 155 160

5 Ala Arg Arg Gln Phe Thr Arg Leu Leu Ala Glu Arg Pro Val Glu Gln
165 170 175

10 Arg Glu Asp Pro Val Gly Glu Trp Leu Thr Trp Thr Leu Glu Arg His
180 185 190

15 Gly Leu Ala Ala Asp Ala Asp Thr Ile Glu Glu Leu Phe Ala Gly Gln
195 200 205

20 Trp Thr Ile Asp Pro Ser Ala Gly Ser Leu Arg Leu Pro Val Asp Gly
210 215 220

25 Glu Val Val Pro Met Arg Phe Val Pro Tyr Asn Gly Ala Ser Val Val
225 230 235 240

30 Pro Ala Trp Leu Ser Glu Pro Pro Ala Arg Pro Arg Val Cys Val Thr
245 250 255

35 Leu Gly Val Ser Thr Arg Glu Thr Tyr Gly Thr Asp Gly Val Pro Phe
260 265 270

40 His Glu Leu Leu Ala Gly Leu Ala Asp Val Asp Ala Glu Ile Val Ala
275 280 285

45 Thr Leu Asp Ala Gly Gln Leu Pro Asp Ala Ala Gly Leu Pro Gly Asn
290 295 300

50 Val Arg Val Val Asp Phe Val Pro Leu Asp Ala Leu Leu Pro Ser Cys
305 310 315 320

55 Ala Ala Ile Val His His Gly Gly Ala Gly Thr Cys Phe Thr Ala Thr
325 330 335

60 Val His Gly Val Pro Gln Ile Val Val Ala Ser Leu Trp Asp Ala Pro
340 345 350

65 Leu Lys Ala His Gln Leu Ala Glu Ala Gly Ile Ala Leu Asp
355 360 365

70 Pro Gly Glu Leu Gly Val Asp Thr Leu Arg Gly Ala Val Val Arg Val
370 375 380

75 Leu Glu Ser Arg Glu Met Ala Val Ala Ala Arg Arg Leu Ala Asp Glu
385 390 395 400

Met Leu Ala Ala Pro Thr Pro Ala Ala Leu Val Pro Arg Leu Glu Arg
405 410 415

5

Leu Thr Ala Ala His Arg Arg Ala
420

10

<210> 15
<211> 240
<212> PRT
<213> Streptomyces eurythermus

15

<400> 15

20

Met Asn Leu Glu Tyr Ser Gly Asp Ile Ala Arg Leu Tyr Asp Leu Val
1 5 10 15

His Gln Gly Lys Gly Lys Asp Tyr Arg Ala Glu Ala Glu Glu Leu Ala
20 25 30

25

Ala Leu Val Thr Gln Arg Arg Pro Gly Ala Arg Ser Leu Leu Asp Val
35 40 45

30

Ala Cys Gly Thr Gly Met His Leu Arg His Leu Gly Asp Leu Phe Glu
50 55 60

35

Glu Val Ala Gly Val Glu Met Ser Pro Asp Met Leu Ala Ile Ala Gln
65 70 75 80

40

Arg Arg Asn Pro Glu Ala Gly Ile His Arg Gly Asp Met Arg Asp Phe
85 90 95

45

Ala Leu Gly Arg Arg Phe Asp Ala Val Ile Cys Met Phe Ser Ser Ile
100 105 110

Gly His Met Arg Asp Gln Arg Glu Leu Asp Ala Ala Ile Gly Arg Phe
115 120 125

50

Ala Ala His Leu Pro Ser Gly Gly Val Val Ile Val Asp Pro Trp Trp
130 135 140

55

Phe Pro Glu Thr Phe Thr Pro Gly Tyr Val Gly Ala Ser Leu Val Glu
145 150 155 160

60

Ala Glu Gly Arg Thr Ile Ala Arg Phe Ser His Ser Ala Leu Glu Asp
165 170 175

27/35

Gly Ala Thr Arg Ile Asp Val Asp Tyr Leu Val Gly Val Pro Gly Glu
180 185 190

5 Gly Val Arg His Leu Lys Glu Thr His Arg Ile Thr Leu Phe Gly Arg
195 200 205

10 Ala Gln Tyr Glu Ala Ala Phe Thr Ala Ala Gly Met Ser Val Glu Tyr
210 215 220

15 Leu Pro His Ala Ala Thr Asp Arg Gly Leu Phe Val Gly Val Gln Ala
225 230 235 240

20 <210> 16
<211> 72
<212> DNA
<213> Artificial

25 <220>
<223> primer

30 <400> 16
ggggaaattca gatctggtct agaggtcagc cggcgtggcg ggcgtgagt tcctccagtc 60
gcgggacgat ct 72

35 <210> 17
<211> 38
<212> DNA
<213> Artificial

<220>
<223> Primer

40 <400> 17
gggcatatga acgaccgtcc ccggcgcgcc atgaaggg 38

45 <210> 18
<211> 50
<212> DNA
<213> Artificial

<220>
<223> primer

50 <400> 18
ccctctaga ggtcactgtc cccggctgtc ggcggcgcc cgcgcatgg 50

55 <210> 19
<211> 52
<212> DNA
<213> Artificial

60 <220>
<223> primer

5 <400> 19
ccccctctaga ggtcatgcgc gctccagttc cctgccgccc ggggaccgct tg 52

10 <210> 20
<211> 81
<212> DNA
<213> Artificial

15 <400> 20
gggtctagat cgattaatta aggaggacat tcatgcgcgt cctggtgacc ggaggtgcgg 60
gcttcatcg gtcgcacttc a 81

20 <210> 21
<211> 40
<212> DNA
<213> Artificial

25 <220>
<223> primer

<400> 21
gggcatatgt acgagggcgg gttcgccgag cttaacgacc 40
30

35 <210> 22
<211> 40
<212> DNA
<213> Artificial

<220>
<223> primer

40 <400> 22
gggtctaga ggtcatccgc gcacacccgac gaacaacccg 40

45 <210> 23
<211> 38
<212> DNA
<213> Artificial

<220>
50 <223> primer

<400> 23
gggcatatgg cggcgagcac tacgacggag gggaatgt 38

55 <210> 24
<211> 38
<212> DNA
<213> Artificial

60 <220>

29/35

5 <223> primer
<400> 24
gggtctagag gtcacgggtg gtcctgtccg gccctcag 38

10 <210> 25
<211> 22
<212> DNA
<213> Artificial

15 <220>
<223> primer
<400> 25
catcgtaaag gagttcgacg gt 22

20 <210> 26
<211> 21
<212> DNA
<213> Artificial

25 <220>
<223> primer
<400> 26
gccagctcgg cgacgtccat c 21

30 <210> 27
<211> 35
<212> DNA
<213> Artificial

35 <220>
<223> primer
<400> 27
gggcatatga gccccgcacc cgccaccgag gaccc 35

40 <210> 28
<211> 42
<212> DNA
<213> Artificial

45 <220>
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